1989

Warren Grant Magnuson Clinical Center Annual Report

U.S. Department of
Health and Human Services
Public Health Service
National Institutes of Health

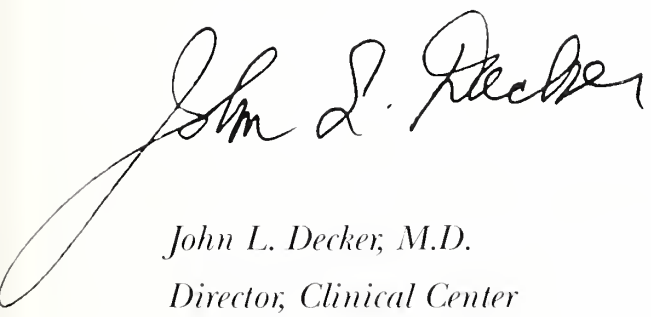
Contents

Foreword

The Warren Grant Magnuson Clinical Center is a complex organism suspended between frontline advances in medical science and the practicalities of patient care and research support. Our goals reflect the duality. We struggle to meet the sometimes conflicting needs of the National Institutes of Health, but even more important is our obligation to provide service to each individual volunteer patient.

The institution has a distinguished record. It is recognized world-wide as a model facility for clinical research. Those of us who work here think we can improve on the past and are intent on doing so.

Some of the year's efforts and accomplishments are detailed in this report. Proud of their role, the people of the Clinical Center did the work described.



John L. Decker, M.D.
Director, Clinical Center

Office of the Director

Bioethics

The mission of the Clinical Center Bioethics Program is to provide leadership and assistance in developing, promoting, and maintaining high ethical standards in patient care and human research. This mission is fulfilled by teaching, consulting, conducting research, and serving as a resource on bioethical issues.

The Bioethics Program assists the director of the Clinical Center in the review of research projects to assure that investigational studies involving human subjects proceed in an ethical manner. The Bioethics Program provides consultation on request to clinical investigators when they are designing research studies to promote identification and resolution of ethical problems before the Institute Clinical Review Subpanel (ICRS). Also, the Bioethics Program provides each ICRS with a consultant who can help address and resolve ethical problems that may arise during the review process.

A clinical bioethics consultation service addresses ethical issues that arise in patient care and research settings. A consultation may be requested by physicians, nurses, other health care providers, patients, and families. The goal of the bioethics consultation process is to facilitate creation of a multi-disciplinary forum to promote identification and resolution of value conflicts that arise in medical care. Although the Clinical Center has never had an Institutional Ethics Committee, plans are underway to establish such a committee in FY '90.

Educational programs and seminars on bioethical issues are provided by the bioethics staff. Program staff helps develop patient information brochures on such ethical issues as "Do Not Resuscitate" orders. Also, in the area of education, the Bioethics Program offers a one-year fellowship in bioethics. The fellowship is open to physicians and those holding post-graduate degrees, and includes experiences in clinical bioethics consultation, research protocol review, participation in policy evaluation and formulation, multi-disciplinary teaching in the area of bioethics, and participation in the research efforts of the Bioethics Program. Each summer two to three student interns rotate through the office. The program has conducted an evaluation of the hospital's policy on the use of Durable Power of Attorney in cognitively impaired research subjects and a study on attitudes concerning disclosure of information to patients and families. In FY '90, it will begin a collaboration with clinical researchers.

Members of the staff have expertise in a wide range of specialities including neurology, geriatrics, philosophy, theology, and education.

Building Services

With an annual budget of $2.5 million, the Building Services Office oversees construction and renovation projects for the building 10 complex. The office is comprised of a three-person staff with expertise in facilities planning and usage, electrical engineering, and air handling systems. The staff checks drawings to ensure compliance with fire safety codes and standards set forth by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Approximately 1,000 work requests are reviewed each year for funds approval and needs verification.

Major accomplishments in FY '89 include the repairs to the Visitor Information Center atrium from fire damage, the completion of construction of the surgery and transfusion medicine addition, the nurse training and child health area, and the enclosure of the 14th floor sundeck to accommodate the Patient Activities and Spiritual Ministry departments. Other major projects include the renovation of the 6D South and 6 West patient care units, and the construction of the 10D Pediatric Intensive Care Unit.

Twice a year the Building Services Office coordinates emergency power tests for the hospital with the Division of Engineering Services. The Clinical Center is one of the few hospitals in the country that can switch to emergency power under controlled conditions to test the emergency generators.

In FY '89 the Building Services Office and the Environmental Safety Office instituted the "Clean Sweep Program." This program, which consists of the monthly surveillance of corridors within the Clinical Center, monitors and arranges for removal of accumulated surplus supplies and equipment in order to comply with the Corridor Utilization Policy.

Clinical Center Communications

Serving roles both within and external to the Clinical Center, the Office of Clinical Center Communications (CCC) is comprised of public affairs specialists and administrative support personnel. Within the hospital, support to other Clinical Center departments is provided through the coordination and production of hospital-wide campaigns to heighten patient, staff, and visitor awareness on topics ranging from nutrition to security.

Employees enjoyed the Clinical Center newsletter, *CC News*, which is back in circulation after a year of suspended publication. New department columns and regular feature stories appear in the monthly publication.

FY '89 was a productive time for patient education efforts. A special project involved the production of three coloring books for pediatric patients, including a special version for children with AIDS. Numerous publications were produced for Clinical Center departments that covered a range of specific therapies and procedures, as well as guidelines for the use of such Clinical Center services as patient activities. To meet the educational needs of non-English-speaking patients, some publications were translated into Spanish and Greek.

CCC staff continued to assist the Confidentiality Education Group in implementing its two-year patient confidentiality campaign. Creatively designed posters hung throughout the Clinical Center helped maintain staff awareness of the need for greater confidentiality.

In coordination with the Security Branch of NIH, CCC staff continued to implement the Clinical Center crime watch campaign, which emphasized employees' role in preventing crime. With posters, flyers, and giveaways, the two-year campaign promotes such themes as "Take time to lock up" and "Don't lose your shirt." Since the campaign began in June 1988, crime has dropped 32 percent.

The "Medicine for the Layman" lecture series again drew standing-room-only crowds. World-reknown speakers discussed such interesting topics as the anatomy of memory, drugs and the brain: the root of addiction, obsessive compulsive disorder, and diabetes in adults. The series, promoted on television and radio stations, and in newspapers and community calendars, received more media coverage this year as a result of CCC's active distribution of videotaped interviews for television and printed information about the lectures.

CCC created original and informative booklets based on the annual lecture series, which were distributed throughout the country. "Medicine for the Layman" booklets produced in FY '89 include *Alzheimer's Disease*, *Stroke Update*, *Risks of Heart Disease*, and *Osteoporosis*. Copy requests for some booklets have reached 1,000 per month. Eleven other "Medicine for the Layman" booklets are in production. A new syndicated column, also based on the popular series, was created in FY '89. The syndicated column, "To Your

Health," enables CCC to reach millions of people who would benefit by information on the latest research at NIH, but who live too far away to attend the lecture series. The column has appeared in 600 newspapers across the country and has been read by three million people.

For the first time, CCC entered publications and a videotape in the National Association of Government Communicators annual Blue Pencil Competition and Gold Screen Competition. Judges awarded first place to CCC for three "Medicine for the Layman" booklets; second place for the booklet, *Cultural Influences on Healthcare;* and an honorable mention for the videotape, *PORTACATH: Patient Information.* Hundreds of entries are submitted from federal, state, and local government agencies across the country.

In FY '89, the Special Events Section (SES) administered the NIH Visitors Program wherein valuable biomedical information was exchanged. An increased number of high-level local and foreign government representatives, medical professionals, and students met with CC and NIH administrators, scientists, and clinicians to exchange specific scientific and health information.

SES staff arranged several NIH lectures, including the annual G. Burroughs Mider Lecture and the R.E. Dyer Lecture. SES provides speakers; answers inquiries; and collects, organizes, and makes available information to investigators, educators, practitioners, and the general public. In addition, the staff handles biweekly orientations and tours for new employees, in cooperation with the Educational Services Office.

SES is responsible for providing policy guidance, program direction and coordination, and general oversight of the Jack Masur Auditorium, the Mortimer B. Lipsett Amphitheater, and the medical board room. In addition, SES provides staff support, consultations, and advice to the Clinical Center, other institutes, and agencies in organizing and arranging conferences, seminars, cultural programs, memorial services, open houses, award ceremonies, and receptions.

Equal Employment Opportunity

The Equal Employment Opportunity Office provides staff support and advice to Clinical Center management on all matters pertaining to equal opportunity and affirmative action. The office also offers information and assistance to employees who feel that they have been the subject of discrimination based on race, color, religion, age, sex, national origin, or handicap.

In addition, the office conducts a number of outreach activities designed to ensure diversity in the applicant pool for Clinical Center employment vacancies. The activities include participation in college career days and interaction with local and national organizations that are potential referral sources for members of underrepresented groups.

Hospital Administrative Officers

An eight-member staff of the Clinical Center Executive Office, the Hospital Administrative Officers (HAOs) provide on-site administrative support to the patient care units and special procedure areas within the Clinical Center. In addition to providing administrative representation for renovations and improvements in patient care areas, the HAOs formulate, implement, and execute budgets for equipment and supplies. With insights incorporating both the views of management and caregivers, the HAOs also provide vital representation on interdepartmental and interagency committees, including safety, pediatric care, standardization, joint procurement, the Children's Inn, administrative policy, and patient care unit upgrade.

The HAOs are the principal Clinical Center representatives for projects involving space utilization and patient care unit design. During FY '89, the HAOs participated in designing renovations to NINDS and NIMH patient care units. Other areas where renovations and upgraded projects were planned or completed during FY '89 included 2J, 3B South, 6D, 5, 8, 9 (Day Hospital), and 13 East, and 7 and 11 West. HAOs played a significant role in the planning and opening of the 10D pediatric intensive care unit addition as well as the 7 West bronchoscopy suite. Also during FY '89, the HAOs participated in the review of requirements and design of the medical intensive care unit, and met with consultants regarding the utilities upgrade.

In FY '89, as in prior years, the HAOs played an active role in the planning of patient care unit upgrades through identification and analysis of system problems. The staff initiated the procurement of physiological monitoring and blood gas equipment, after completing clinical trials and evaluations. The addition of four radio channels to the master television system and centralized videotape playing was planned and implemented to provide an additional entertainment feature for patients. The HAOs directed a successful trial and purchase of disposable patient room telephones, which has resulted in significant savings for the Clinical Center.

Hospital Epidemiology

Nosocomial is defined as pertaining to or originating in a hospital, as in nosocomial infection. The Hospital Epidemiology Service (HES) monitors the occurrence of nosocomial infections, investigating clusters or outbreaks of such infections, and devising policies and procedures to prevent them. In addition to these and related responsibilities, HES educates staff and patients regarding prevention of nosocomial infections and conducts research into the epidemiology, pathogenesis, and prevention of infections. During FY '89, HES staff members frequently responded to patient and staff concerns about the possible transmission of the human immunodeficiency virus (HIV), the cause of Acquired Immunodeficiency Syndrome (AIDS).

HES continues to focus on HIV in the Clinical Center, disseminating current epidemiologic information (data on incidence and distribution), and emphasizing the similarities of the epidemiology of HIV to that of hepatitis B. To minimize the potential for work place or occupational transmission of HIV and hepatitis B, HES continues to revise isolation precautions specifically designed to eliminate exposure of health care workers to blood or body fluids of infected patients.

In FY '89, HES continued training Clinical Center staff in the practice of "Universal Precautions," in accordance with guidelines established by the Occupational Safety and Health Administration (OSHA). Universal Precautions means that all patients' blood and body fluids are to be considered potentially infectious. This practice is designed to minimize the potential for the nosocomial transmission of HIV, hepatitis B, and other bloodborne pathogens.

The HES staff also conducts numerous formal and informal educational sessions for Clinical Center departments and institute programs. To minimize confusion about HIV, the staff also conducts many educational programs for professionals and non-professionals in the community. Many medical, nursing, and technical associations, as well as lay organizations, request HES to provide information, answer questions, and allay fear of this disease.

To evaluate the precise risk associated with exposure of employees to HIV-infected blood or body fluids, HES and the Occupational Medical Service (OMS) continue to conduct a prospective study in which antibody levels to the organism are measured in annual or more frequent blood samples. The risk has been found to be so small that it is difficult to measure.

Other HES studies have evaluated the potential impact of Universal Precautions on decreasing health care worker exposures to patient blood and body fluids. Significant decreases in exposures to blood and body fluids have occurred among Clinical Center staff since the implementation of Universal Precautions in FY '88.

The hepatitis B immunization program continues in collaboration with the Department of Transfusion Medicine and OMS.

Hospital Safety

The mission of the Hospital Safety Program is to specify requirements for equipment, hazardous materials, hospital maintenance, and construction, and to promote safe practices to reduce the hazards to patients, staff, and visitors. In FY'89, the Safety Officer prepared the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) written progress report for life safety. The greatest risk for multiple fatalities in the Clinical Center is fire. The Safety Officer reported, "We averaged two fires per month in the Clinical Center. Fortunately, they resulted in minimal property damage, but the potential exists for a major catastrophe."

One major accomplishment for the year was successful orchestration activities involving expenditures in excess of $10 million to enhance the safety of the occupants in the Clinical Center. These activities addressed the building's deficiencies regarding current provisions of the National Fire Protection Association. To reduce the risk associated with our diminished fire suppression protection (e.g., sprinklers), employee training was intensified. More than 900 employees and guests attended safety seminars, and an additional 1,600 attended "hands-on" fire extinguisher training. The NIH Fire Department conducted more than 400 fire evacuation drills last year and it expects to double that number during FY'90.

Several significant incidents involving injuries related to physical hazards in public areas were investigated as part of the hazard surveillance activities. For example, the benches in the second floor cafeteria were shortened and the cobblestone sidewalk was repaired to eliminate tripping hazards; the patio on the west end of the building was sandblasted to make the surface less slick when wet; and moving vehicle warning signs were posted on the B2 level. Many other potentially hazardous situations involving areas under renovation were vigilantly monitored by the Building Services Office and Safety Office to reduce the risk of hazards to building occupants.

Surveys for occupational exposures and environmental contamination with hazardous materials are also part of the hazard surveillance. Some of the annual assessments performed include levels of ethylene oxide, a toxic sterilant gas used in CHS; waste anesthetic gases; formaldehyde vapors in the anatomical pathology services; friable asbestos; mercury or antineoplastic drug contamination from accidental spills; and lead in the potable water supply. Specific measures were implemented to reduce elevated levels of contaminates to below allowable threshold limits.

Other projects reduced the risk of harm to the environment. During the past year, transformer oil containing polychlorinated biphenyls (PCB) was removed from the high-risk building 10 electrical vaults at a cost of $150,000. In addition to the hazards associated with fire, contamination with PCB may have required closure of the Clinical Center for decontamination. All photographic film processors are now equipped with a silver recovery unit to recycle this precious metal and prevent discharges to the storm sewers. The

Clinical Center now recycles all types of batteries; many of which are used on power conditioners and motorized equipment.

The Safety Officer conducted a survey of employees who experienced a high risk exposure to patients' blood in an effort to devise strategies to reduce the risk of blood-borne infection. This effort was in conjunction with the Hospital Epidemiology Service and the CC Standardization Committee. Information gleaned from the study was used to assess medical supplies and equipment in terms of biosafety, collate employees' suggestions, and identify areas for employee training. Also related to the safety of equipment was the expansion of the Biomedical Engineering and Instrumentation Program (BEIP) testing program. Beginning this year, all medical equipment is checked for electrical safety as well as performance standards to ensure that all mechanical components are functional and that calibrations match the manufacturer's specification.

A new flyer, *Alerts*, was issued by the Safety Committee. The first edition addressed the potential for fire in microwave ovens. The second introduced the BEIP change and related safety concerns.

Several employees volunteered in the disaster relief efforts to help victims of Hurricane Hugo in St. Croix. Medical supplies and personnel were dispatched to the island after the storm as part of the PHS Disaster Medical Alert Team. Closer to home, the Clinical Center tested the availability of communications and diagnostic services during the emergency power test. Ability to adapt also was tested this past summer when severe weather resulted in several power fluctuations. Safety and Building Services worked closely with the departments to address preventive measures and reduce the impact on sensitive medical equipment.

Management Support

The Office of Management Support Services plans and executes the budget of the hospital and administers the personnel management programs for the staff. The budget office staff is comprised of budget analysts and clerks. An analyst monitors the department's performance within its current budget allocations, and works with the department heads when problems are identified. In FY '89, the hospital employed 2,030 FTEs with an operating budget of $161,907,000.

The personnel office is staffed by personnel assistants and personnel management specialists. The personnel assistants oversee day-to-day operations such as processing actions for recruitment, promotion, within-grade increase, quality step increase, transfer, conversion, retirement, and separation. Personnel management specialists advise one or more departments in major organizational, administrative, and personnel management matters. Each specialist is responsible for recruitment, staffing, classification, employee relations, employee development, equal employment opportunity, and upward mobility.

In FY '89, personnel actions processed (including hirings, pay increases, promotions, and other actions) remained stable from FY '88. With an average complement of 2,266 employees, 539 new employees joined the Clinical Center staff and 586 left.

The Clinical Center substantially improved its ability to recruit and retain well-qualified nurses and allied health professionals in an increasingly competitive labor market through the continuing implementation of many Title 38 personnel management authorities. Within the Clinical Center, vacancy and turnover rates in the majority of these health care fields dropped significantly as a result of Title 38 authorities. Under the authorities of Public Law 100-436, the Clinical Center can set salaries for health care employees at rates that are competitive with the hospital labor market in this area. Increased base pay scales now exist for nurses and 11 allied health occupations within the Clinical Center. Additionally, broadened premium pay provisions provide higher overtime rates, on-call pay, and Saturday differential for many employees covered by Title 38. To deal with projected shortages in many of the health care occupations through the year 2000, Clinical Center managers and the Office of Management Support Services will continue to explore employment and compensation options provided by this legislation.

During FY '89, the educational services office (ESO) oriented almost 800 new employees (including contract employees), updated two videotape presentations on personnel issues, and revised the *Clinical Center Employee Handbook*. A departmental orientation guide was developed and distributed to all department heads and supervisors.

ESO also presented an all-day workshop, two half-day workshops, and a series of six lectures on issues in death and dying. This program's expanded effort was targeted at Clinical Center caregivers who must cope with terminally ill patients. Videotapes of the lectures are available for other hospitals and health care providers.

ESO coordinates a monthly seminar series offering supervisors the flexibility to attend those courses most relevant to their jobs. A "How To" series includes such courses as "How To Manage Your Meetings," "How To Complete the SF-171," "How To Make Effective Presentations," "How To Manage Stress," and "How To Communicate More Effectively."

A major training needs assessment was conducted with all department heads and a sample number of supervisors. Programs for FY '90 and '91 will be based on the results of this needs assessment.

In addition to the education activities during FY '89, ESO processed 3,102 training forms (HHS-350) totalling approximately $650,000. This represents a 14 percent increase in forms processed and a 19 percent increase in dollars spent over the previous year.

Medical Board Services

The Office of Medical Board Services provides assistance to the Medical Board, the organization that develops and recommends policies governing standards of medical care in the Clinical Center. The office sets the agenda for the meetings and serves as the executive secretariat for the board, maintaining the files and carrying out board decisions as necessary.

This office also assists the Clinical Center director by maintaining the medical-administrative policies that govern the provision and assurance of high quality patient care. During FY '89 a review of the entire body of policy statements was initiated. A number of policy issuances were reaffirmed, others were determined to be outdated and were rescinded, and still others were modified to reflect current conditions. Four new policies were established, covering such diverse subjects as HIV testing, the provision of emergency medical services, cardiopulmonary resuscitation training, and the use of guide dogs in the Clinical Center.

Patient Representative

he Patient Representative Program provided assistance and orientation to approximately 1,900 patients and family members during FY '89. Close to 1,400 were patients new to the Clinical Center, and the emphasis was to further their understanding of the hospital's research mission and the finite aspects of the studies for which they were accepted. Trained volunteers provided communication, support, and information to an average of 35 family members and visitors in the operating room and intensive care area each week day.

The program director answered more than 300 requests from patients, families, and staff for clarification of policies, investigation of difficult situations, or assistance with resolution of problems. The documentation of all patient encounters—shared with hospital staff and reported to the Office of the Director—served as a means of monitoring the hospital's response to patient needs and of identifying problem areas. The high visibility of patient experiences and perceptions was maintained by the patient representative through written reports, participation on key hospital committees, and orientation sessions for patient care support staff and students in the basic hospital disciplines.

The philosophy of the program is that the best interests of patients will be served if they understand the research milieu, are familiar with their rights and responsibilities as research subjects, and feel comfortable communicating with a staff sensitive to their concerns.

Special Programs

During FY'89, the Office of Special Programs coordinated the recruitment and placement of medical and dental students who sought research training experiences at NIH. During FY'89, a record 127 first- and second-year medical and dental students participated in the Summer Research Fellowship Program, which emphasizes the development of investigative skills and encourages students to pursue careers in biomedical research. The Clinical Electives Program enrolled 129 third- and fourth-year medical students in 17 clinical subspecialities, including alcoholism, anethesiology, clinical dental care (dental students), clinical otolaryngology, medical informatics, critical care medicine, endocrinology and metabolism, neurobiology of aging and dementia, hematology-oncology, immunology, medical genetics, medical-surgical neurology, nuclear medicine, pain and neurobiology, pediatric psychopharmacology, psychiatry/psychopharmacology, and surgical oncology. The essence of this educational experience is a close association between the student, medical staff fellows, and physician scientists in the institutes.

Through the Normal Volunteer Program, individuals participate in clinical research by serving as healthy patients who are involved in selected protocols. These "control groups" enable clinicians to learn more about normal physiology and metabolism, which may lead to a better understanding of the causes of disease and contribute to the development of new treatments. During FY'89, 65 students from eight colleges participated in the Normal Volunteer Program. Students, who are recruited from colleges and universities through cooperative arrangements, spend a semester at the Clinical Center participating in a variety of research protocols. They also are assigned to research laboratories where they gain valuable experience under the guidance of Clinical Center and institute investigators. Many local residents also participate in similar studies through the Normal Volunteer Program. During FY'89, 345 inpatient community volunteers participated.

Medical Departments

Anesthesia

Anesthesia is provided for Clinical Center patients by an inhouse division of Georgetown University's Department of Anesthesia. The section is comprised of seven physicians and five recovery room nurses. In addition to the clinical practice of anesthesia, the staff provides medical consultation in the areas of pain therapy, critical care, and resuscitation; offers professional support to institutes in investigational programs; participates in teaching anesthesia and advanced cardiac life support to post-graduate physicians, residents, medical students, and other health professionals; and initiates primary clinical investigations.

The ongoing advanced cardiac life support (ACLS) course, offered since 1980, is sanctioned by a local chapter of the American Heart Association and accredited for 16 CME hours. During FY '89, four courses were presented and 47 ACLS providers certified. In addition, courses in basic cardiac life support were conducted in conjunction with Occupational Medical Service.

Three residents rotate through the Anesthesia Section. During the three-month rotation, one resident receives training in cardiovascular anesthesia and the other two receive training in anesthesia for general surgery and other surgical subspecialty cases. In addition, eight medical students participate in the anesthesia fourth year clerkship. During the four-week elective period, the students receive didactic teaching and hands-on experience in the operating room.

In FY '89 inservices included universal precautions, safety and risk management, ethical aspects in anesthesia management, fire safety, radiation safety, electrical safety, and infection control in the operating room.

Intraoperative research includes halothane hepatotoxicity; the response of patients with idiopathic hypertropic subaortic stenosis (IHSS) to various anesthetic techniques; effects of cardiopulmonary bypass and anesthesia on oxygen and carbon dioxide metabolism; effects of anesthesia and surgery on intraoperative hormone levels; effects of stellate ganglion blockade on the cardiac electrophysiology of patients with IHSS; and effects of intraoperative ventilatory management on postoperative lung function in patients undergoing cardiac surgery.

In FY '89, anesthesia and support services were provided in 2,412 instances, including 174 emergencies and 195 open heart procedures. The recovery room cared for 1,644 patients, including 393 outpatients.

Clinical Pathology

The Clinical Pathology Department is divided into five services: clinical chemistry, hematology, immunology, microbiology, and phlebotomy. In FY '88, the department had significant difficulty hiring medical technologists because private hospitals in the area offered higher salaries. The government put into effect a special pay rate for medical technologists, which took effect Jan. 1, 1989. The special pay rate enabled the department to hire a number of highly qualified technologists. Recruitment efforts for medical technologists have been active in area schools of medical technology and have provided a number of highly qualified candidates.

In FY '89, the clinical chemistry service installed a new high-volume multitest automated analyzer requiring smaller sample volumes and less labor, and operating at a lower cost per test. Also a number of Macintosh personal computers were installed and made available to secretaries, technologists, and senior staff personnel.

Active research and development efforts continue. A study in collaboration with NCI defined the changes in laboratory test results after the infusion of IL-2. There is progressive impairment of liver and kidney function during the course of IL-2 therapy, which is reversed over a period of several days after stopping IL-2 therapy. A study in collaboration with NIMH showed that the changes in serum and blood cell magnesium values in women with premenstral syndrome (PMS) do not differ significantly from women without PMS. The study suggests that magnesium deficiency is not a cause of the premenstrual syndrome. A study of patients who received mouse immunoglobulins for therapeutic or imaging purposes showed that patients may become immunized and produce heterophile antibodies that can interfere in an immunometric assay for thyrotropin. Another study demonstrated an inhibitory effect of lipoproteins on endotoxin activity *in vitro*. Also, the possible role of oligoclonal immunoglobulins in distinguishing etiologies of viral hepatitis was explored. The effect of lyophilization on the accuracy of cholesterol measurement was studied.

The hematology service documented that tissue necrosis factor, IL-1, γ-interferon, and heparin modulate von Willebrand factor (vWf) synthesis and secretion from endothelial cells. Gamma-interferon significantly reduces endothelial cell vWf secretion in a specific dose and protein synthesis dependent fashion. Heparin enhances vWf production and release. The use of aspirin as an antithrombotic drug was tested in individuals. Studies showed that although aspirin can inhibit platelet aggregation to agonists (such as ADP, epinephrine and arachidonic acid) when these platelets are stimulated by any of these agonists, significant platelet activation occurs with the exposure of fibrinogen and von Willebrand factor on the platelet surface. These studies help shed light on the antithrombotic effect of aspirin and why in certain instances aspirin is ineffective. Patients with type IIb von Willebrand disease who have thrombocytopenia and increased ristocetin induced platelet aggregation have been identified to have increased amounts of fibrinogen and von Willebrand factor on the surface of their platelets. These individuals have partially activated platelets as a consequence of their von Willebrand disease. A murine monoclonal antibody has been defined that identifies an activation dependent platelet glycoprotein. This antibody enhances the binding of von Willebrand factor and fibrinogen to platelets that had been stimulated with a subthreshold amount of ADP or epinephrine. This antibody has promise for identifying activated platelets *in vitro* and to enhance hemostasis in patients with coagulation or platelet disorders. Heparin binding to platelets occurs to both resting and activated platelets. Crosslinking heparin to the surface of platelets is being used to identify the heparin receptor on platelets. A new automated system to enumerate reticulocytes has been implemented in the laboratory.

The immunology service continues to provide test development and support for clinical investigation. A recent example includes the application of the anti-neutrophil cytoplasmic antibody test in the evaluation of bronchoalveolar lavage fluids from patients with Wegener granulomatosis. In addition, laser based flow cytometric lymphocyte

phenotyping continues to expand in collaborative projects. A new area for the application of this technology is in following lymphocyte trafficking and surface antigen modulation after therapy with yttrium conjugated tumor specific monoclonal antibody. The service also continues to provide education in diagnostic laboratory immunology to clinicians and other laboratory workers.

The microbiology service continues to emphasize the development and assessment of techniques for the rapid detection and identification of pathogenic microorganisms. Studies continue on the evaluation of a variety of commercially available reagents for the detection of *pneumocystis carinii*, based on the monoclonal antibody procedure developed at NIH. Studies also are underway assessing the utility of a fluorescent fungal stain for detection of *pneumocystis*. Currently available rapid methodology for the detection and identification of both cytomegalovirus and rotavirus is being investigated to determine whether it will be feasible to offer these tests on a routine basis in-house. Studies on a laser-light scattering instrument indicate that the instrument might, if significantly modified, prove useful for susceptibility testing of mycobacteria. Investigations on *blastocystis hominis* and its role in human disease continue. A commercially available automated system for identifying bacteria and performing susceptibility testing is under evaluation, with a view to its possible incorporation into the routine workflow of the service. The intensive consultative activity with the NIH infectious disease groups continues resulting in a number of collaborative activities including the preparation of several case reports on unusual pathogens isolated from NIH patients.

The phlebotomy service added two additional modules to the outpatient area to accommodate the increased number of patients requiring service. There was significant difficulty for recruitment and retention of competent phlebotomists. This was caused by an inadequate number of people in this profession in the vicinity and higher salaries being offered by private hospitals. The department is exploring ways of offering more comparable salaries to phlebotomists.

Critical Care Medicine

The Critical Care Medicine Department (CCMD) directs the medical intensive care unit and provides consultative services for seriously ill patients, supervises respiratory therapy and hemodynamic monitoring, provides critical care training, and conducts research on basic and clinical problems relevant to seriously ill patients.

Frequently patients have serious, life-threatening problems that require the special skills of critical care physicians and specially trained nurses and technical personnel. During FY '89 CCMD admitted 256 seriously ill patients for 2,434 days of intensive care. An additional 609 patients were admitted for short-term stays for such clinically-indicated and protocol-required invasive procedures as bronchoscopy, heart biopsy, right heart catheterization, and central line placement. The majority of the CCMD patients continued to be admitted from the National Cancer Institute (45 percent) and the National Institute of Allergy and Infectious Diseases (37 percent), although every institute used CCMD services at some time during the year.

The primary responsibility and focus of CCMD is patient care. Many therapeutic regimens in the National Cancer Institute; National Institute of Allergy and Infectious Diseases; National Heart, Lung, and Blood Institute; and other institutes require the ability to support adult and pediatric patients through critical illnesses that include difficult management problems induced by chemotherapy, radiation, or surgery. The number of patient admissions increased by 20 percent since FY '88. Respiratory therapy and hemodynamic monitoring increased by 30 percent in the past year. Several institutes increasingly are studying patients with more advanced and life-threatening problems than they did in past years.

Critical care medicine is recognized as an official subspecialty by internal medicine, surgery, anesthesiology, and pediatrics. CCMD has trained four fellows each year since 1982 and fellowship graduates currently occupy leadership positions in academic institutions across the country.

The department's research is collaborative with the institutes and focuses on septic shock, adult respiratory distress syndrome, the effects of endotoxin, AIDS, and respiratory mucous production. The sophisticated facilities of the department make possible important studies that are difficult to perform at other institutions. These results are published regularly in high quality peer review journals and have brought the department national and international recognition.

Diagnostic Radiology

In FY'89 the Diagnostic Radiology Department made major changes in its traditional structure, reflecting the trend away from film-based to digital imaging. For those who think of diagnostic radiology in terms of chest films and barium studies, the changes are indeed dramatic. As all the equipment in the eight-year-old department approaches the limits of useful life, the department is planning a systematic replacement of all the radiographic units, beginning with two fluoroscopic rooms. When the department first opened, 12 to15 barium studies were performed every morning. During the past two to three years, it has become apparent that a single replacement fluoroscopic room is adequate to accommodate the three to four barium studies currently performed daily. When problems of abdominal abscess localization or the staging of tumors arise, clinicians order computerized tomographic (CT) or magnetic resonance (MR) scans rather than the traditional barium studies. Ultrasound of the gallbladder has replaced the previously common oral cholecystographic examination. Space made available by the elimination of one fluoroscopy room will be used for a more modern imaging technique, such as a transrectal or transvaginal ultrasound, or a low field MR magnet to accommodate the increasing demand for bone marrow studies.

Even the traditional chest x-ray is not immune to encroachment by digitized techniques. As the department contemplates replacement of the chest x-ray units, new techniques for producing digital chest x-rays, comparable in resolution to the traditional chest film, are being considered. They have a much broader range of density enhancements (no repeats), simplified storage and retrieval, as well as a possibility of transmitting portable and conventional chest images to such critical areas as the medical or surgical ICU for on-line consultation. The traditional appearance of a radiology department is changing in ways unanticipated only a few years ago. The film library may soon be completely digitized, stored on optical discs and available on monitor throughout the wards and clinics at a moment's notice.

Another area of burgeoning research in the radiology department is MR spectroscopy. To date, it is limited to prolonged and tedious studies on patients with large intracerebral tumors, evaluating the biochemical effects of chemotherapy or radiation therapy to predict, at an early stage, the response to either therapeutic modality. If *in vivo* MR spectroscopic analysis becomes a feasible and diagnostically useful clinical study in oncologic patients, the potential for an expanding clinical responsibility is enormous.

The most dramatic development currently in the planning stages is the acquisition of a 4 Tesla whole body magnet for clinical spectroscopy. Only a handful of such high field magnets are in existence. Although imaging at such high field strengths is currently impractical, this machine will be used to determine the value of spectroscopy enabling precise spectroscopic analysis of small tumor volumes within the body.

In the department, in conjunction with the Nuclear Magnetic Resonance Research Center (NMRRC), there is considerable activity looking into rapid MR scanning using echoplanar techniques. This would convert the currently prolonged imaging acquisition time of many minutes into a subsecond acquisition. This phenomenon would enhance the value of MR, particularly in areas where prolonged scanning times now limit its usefulness, such as the chest and upper abdomen. Department investigators are pioneering efforts to adapt rapid MR image acquisition to the clinical environment.

In summary, magnetic resonance imaging continues to dominate the expanding field of diagnostic imaging.

The department also is experiencing change by virtue of the increasingly common spectacle of the ultrasonographic specialist in operating room greens. Five years ago a collaborative study with endocrine surgeons explored the value of ultrasound performed during the operation. The payoff has been immense. Many outstanding results in parathyroid and islet cell surgery relate directly to the use of intraoperative ultrasound for the detection of these small tumors. Small central liver metastases, as well as deep gliomas, both within the brain and the spinal cord, are easily detected with intraoperative ultrasonic techniques. The project has been collaborative, and its strongest and most supportive proponents are now members of the surgical staff who will not take a patient with an insulinoma or Zollinger-Ellison syndrome to the operating room without the availability of this modality. It has been a success story in which the diagnostic radiology department played a pioneering role. Surgeons are learning to operate the equipment and soon will be widely using this "electronic extension of their own fingers" in the OR to detect occult lesions throughout the body.

Nuclear Medicine

In FY'89 the Nuclear Medicine Department (NMD) provided more diagnostic scintigraphy services for Clinical Center patients and continued collaborative research efforts with institutes to develop biomedical knowledge through the safe application of radionuclides.

The department supports basic and clinical research in Positron Emission Tomography (PET). PET is a collaborative effort among the institutes and the cyclotron/radiochemistry and PET sections. Extensive resources include two medical cyclotrons, several hot cells and laboratories for radiochemistry, three PET tomographs (two brain units and a whole-body instrument), and computer hardware and software for the generation and analysis of physiological images.

The cyclotron/radiochemistry section is responsible for the development of new positron-emitting radiopharmaceuticals for PET, in addition to the routine production of these agents for clinical research studies. New radiopharmaceuticals available in FY'89 include ^{18}F-insulin, used to image insulin receptors, and ^{18}F-difluoropalmitate, used to study fatty acid turnover. Preliminary imaging studies with these tracers in animals have been performed. New targetry was implemented on the CS-30 cyclotron to permit its use interchangeably with the JSW Cyclotron. Automation of specific synthesis techniques continues in an effort to facilitate the production of ^{18}FDG, a tracer used to measure regional glucose metabolism, and ^{18}F-cyclofoxy, which is used to study opiate receptors in the brain.

The whole-body tomograph became routine in FY'89; several protocols involving patients with cardiac disease began with this instrument. In addition, new clinical research protocols were implemented on the brain scanners. These included several studies to map the response of the human brain during neurobehavioral tasks, such as movement and cognitive activity, by determining local blood flow changes. A new, generator-produced radiopharmacentical, rubidium-82, was introduced to permit studies of blood brain barrier integrity in tumor patients and of myocardial perfusion. Ongoing PET protocols continue to study the pathophysiology of a variety of conditions affecting the central nervous system, including Alzheimer disease, normal aging, brain tumors, epilepsy, Parkinson disease and other movement disorders, schizophrenia, and depression.

NMD continues its collaborative research program in the diagnostic and therapeutic applications of radiolabeled murine and human monoclonal antibodies. The major objective of this program, which includes interactions between NMD and several NCI branches and laboratories, is to optimize the use of radiolabeled antibodies to detect and treat various cancers. The ongoing clinical studies are attempting to define the pharmacokinetics of radiolabeled antibody distribution in patients with cancer, determine those characteristics of the test that are important to ensure tumor targetting, assess the safety of these procedures for the cancer patient, and provide a preliminary determination

of the efficacy of these tests in the diagnosis and treatment of various cancers. Current emphasis is on the radioimmunoscintigraphy and radioimmunotherapy of leukemias and lymphomas, although several protocols remain open to test new-generation and chimeric forms of anti-adenocarcinoma antibodies as well. More than 250 patients participated in these protocols during the past three years, allowing the physician investigators in NMD to contribute to this state-of-the-art field of human research.

The department entered into an educational affiliation with the George Washington University to train nuclear medicine technologists. The program leads to a two-year associate degree in nuclear medicine technology. Two to five students per year will participate in a clinical rotation that will offer clinical experience in the various imaging areas of the department. Special emphasis will be placed on computerized image acquisition analysis capabilities, as well as radiolabelled antibodies and positron emission tomography. Even the special pay rates under Title 38 for NIH technologists have failed to draw a sufficient number of technicians to NIH. Fewer students have chosen to be trained in this field nationwide, and a large number of former training programs have closed. The hope is to attract GW undergraduate students to become nuclear medicine technologists through emphasis on the unique character of the NIH experience.

Rehabilitation Medicine

The Department of Rehabilitation Medicine provides treatment to hospital patients who need physical and occupational therapy, speech and language evaluation, and physical medicine. The staff works with patients and helps them reach their greatest functional potential.

FY '89 was a productive year for the department. The medical section completed a study of the effects of exercise on patients with polymyositis and concluded that these patients are able to participate in a month-long isometric exercise program without significant CPK enzyme rises. Those patients with little muscle atrophy are able to increase their strength significantly. Other research projects include a randomized trial of the outcome of bracing versus non-bracing in osteogenesis imperfecta; a biomechanical assessment of rheumatoid arthritis patients pre- and post-Hoffman procedure; and a biomechanical analysis of normal knee movement.

The biomechanics laboratory continues to provide clinicians and researchers at NIH with valuable quantitative information concerning human motion and the functional mechanisms that produce human motion. With its emphasis not limited to the study of human gait, the laboratory soon became a valued resource for researchers and clinicians concerned with less frequently studied areas of human motion: speech, upper extremity prosthetics, and neurological impairments. While the study of human gait will continue to dominate the topics of investigation in the biomechanics laboratory, the diversity of research topics will continue.

Occupational therapy continued to refine the baseline assessments for HIV pediatric oncology programs, placing more emphasis on function and play as reflected within the age-specific population. A similar emphasis is on the development and refinement of the activity questionnaire for the Alzheimer population.

In response to a clinical need for service requested by the 2 West nursing staff surgical branch, the physical therapy section instituted phase I of the cardiac rehabilitation program in January 1989. This program provides individually prescribed exercise programs to maximize the physical endurance of patients undergoing evaluation and treatment of coronary artery and valvular heart disease. The program consists of a thorough initial evaluation, followed by a detailed inpatient program of graduated exercises in a fully monitored environment. Patients also are instructed in health promotion activities and self-monitoring skills to assess perceived levels of exertion. In addition, these individuals are provided with home programs emphasizing a continuation of their activity program.

The speech-language-pathology section continues to make advances in bridging the gap between research procedures and clinical applications for speech and swallowing. The major research focus remains in the use of non-invasive ultrasound imaging of the oropharyngeal area to study both normal and abnormal physiology. Based on research that applied ultrasound technology to the study of soft tissue, the section developed a model of three-dimensional tongue movement. The model segments the tongue both lengthwise and crosswise, and presents the effects of segmental movement on the production of speech sounds. Collaborative work on three-dimensional biomechanical analysis of jaw and lip movement during chewing provides new information on the interdependence of the oral structures. Using these techniques researchers have studied a variety of abnormal conditions and determined the signs and patterns of oral-pharyngeal and swallowing disorders in conditions such as cystinosis, bulimia, Sjogrens Syndrome and post-poliomyelitis. Future investigations will focus on application of these techniques to the study of vocal fold function and infant oral development.

Surgical Services

The high standards of patient care in the operating room are accomplished through a team approach. The team consists of a variety of health care providers with specific responsibilities in the patient's care, including surgeons, anesthesiologists, anesthesia technicians, nurses, health technicians, housekeepers, and clerical and administrative staff.

The key planner in this process is the nurse coordinator (head nurse) who organizes and implements many functions, including determining the number of staff nurses and nurse specialists required for the types of surgery being performed; preparing the proper instruments and equipment; instructing nurses and technicians in the principles of asepsis and safe patient transport; planning for environmental maintenance; and instructing housekeeping staff in the principles of contamination, sterility, and the value of efficient cleaning time between procedures.

Completion of an addition to the main surgical suite is planned for FY '90. This construction will add three operating rooms, thus completing the long-range plan for all surgical procedures to be performed within the main surgical suite.

Transfusion Medicine

The Department of Transfusion Medicine (DTM) participates in a variety of service, research, and educational activities barely suggested by the term "blood transfusion." While blood collection, typing, component preparation, and storage remain the department's primary function, the department is involved in such diverse activities as treatment of heart disease, experimental cancer therapy, inactivation of viruses, and preparation of bone marrow for transplantation. Such activities reflect the scope of modern transfusion medicine.

Blood usage at the Clinical Center increased modestly during FY '89. Close to 8,000 units of red cells and 24,000 units of platelets were transfused. Because the regional Red Cross suffered unusual shortages, the department relied increasingly on its own blood donors. Approximately 65 percent of the whole blood and red cells was collected from NIH volunteers. The department supplied all the platelets and plasma required by Clinical Center patients. DTM probably collected more units of white cells for transfusion, about 260, than any other facility in the world. These cells are used for patients with chronic granulomatous disease, a rare inherited disorder of abnormal white cell function. These patients have been recruited from across the country to participate in NIH clinical research studies.

DTM participated for the third year in the National Marrow Donor Program. This program recruits and tissue types potential bone marrow donors for patients who require a transplant but do not have any tissue-type identical relatives. DTM now has a local listing of more than 10,000 typed donors and has arranged for nine transplants for patients as far away as Seattle, Montreal, and Minneapolis. Staff members also have volunteered time to help recruit donors for several local patients who could not be matched on the national registry.

The immunology section's service and research functions involve transfusion-transmitted disease. While national concerns still focus on AIDS, DTM activities have been directed toward prevention of hepatitis and other viruses such as HTLV-I, a retrovirus associated with leukemia and neurologic disorders. The immunology section performed close to 100,000 tests for these viruses, a 34 percent increase over FY '88. Most of the testing was performed on donated blood and on diagnostic specimens from hospital patients. Several important research reports emerged from this work.

DTM staff published papers describing hepatitis C, the major virus associated with post-transfusion hepatitis, and further defining tests for the AIDS virus and other retroviruses. The first major compilation of clinical and laboratory data from a five-year controlled study of blood donors infected with the AIDS virus was published in the *New England Journal of Medicine*. One important result of this study was the clear distinction between infected donors and donors with false positive tests. Finally, DTM staff coordinated a national study to determine whether a new assay for the presence of the

AIDS virus could be useful as a screening test for blood donors. After analyzing the results of more than 500,000 volunteer blood donations, the department determined that this assay added little to current screening techniques. Results of this study influenced the Food and Drug Administration to withhold licensure of this test for screening purposes and saved several million dollars annually in health costs.

Specific blood components such as plasma, platelets, and leukocytes can be obtained efficiently using automated cell separation or "apheresis" techniques. These same instruments can be used for several other purposes. More than 3,000 research components for NIH scientists were prepared by apheresis procedures. Nearly 100 therapeutic procedures were performed for such diverse clinical indications as red cell exchange in sickle cell disease and decreasing toxic levels of suramin, an experimental cancer drug, by removal with plasma exchange. More than 500 procedures were performed to support therapeutic clinical trials, such as treating patients with polymyositis and removing low density lipoproteins from the blood of patients with severe coronary artery disease. Cell separation instruments also were used to process bone marrow for frozen storage and for different kinds of marrow transplantation protocols. DTM is a leader in this technology.

The main service laboratories perform more than 12,000 blood typings, and an additional 25,000 crossmatches and antibody screenings each year. Other laboratory services include a red cell reference laboratory for solving unusual antibody problems and evaluating more then 100 reported transfusion reactions each year; an HLA (tissue-typing) laboratory, recently commended for its typing accuracy in an international cell exchange program; and a special services laboratory that is a national leader in technology for radiolabelling blood cells. These laboratories are essential for standard clinical care, and have helped answer a number of important clinical questions, such as how well filtered platelets survive, whether irradiated red cells and platelets can be stored, and whether radiolabelled white cells can help detect occult sites of infection.

DTM continues to train many prominent professionals in the discipline of transfusion medicine. Accredited by the American Council of Graduate Medical Education, the staff fellowship program enters one physician each year into a two-year program of service and research. Students in the specialist in blood banking (SBB) program won two of five competitive research scholarships awarded by the American Association of Blood Banks in FY '89. SBB, established for medical technologists in 1966, currently enrolls three students in a one-year program. Department personnel also conduct extensive in-service education programs for Clinical Center physicians and nurses. For the last eight years, DTM sponsored a one-day scientific symposium devoted to recent advances in transfusion medicine. For service, research, and education, DTM is recognized nationally.

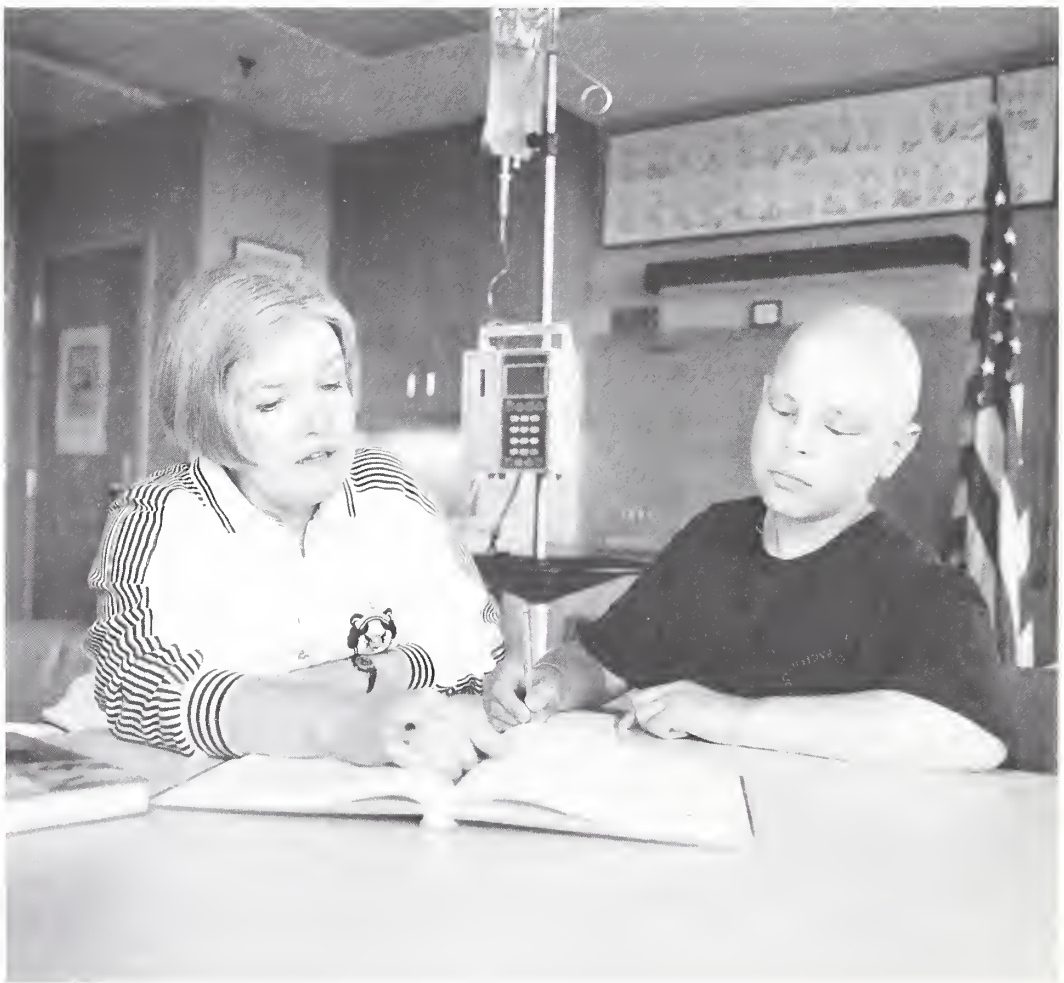
Patient Care Services

Children's School

The NIH Children's School, established in 1953, helps students keep up with their classroom studies while undergoing treatment at the Clinical Center. This traditional one-room schoolhouse on the 10th floor, staffed by six teachers from the Montgomery County Public School System, works to meet the educational needs of inpatients and outpatients, grades kindergarten through 12.

In FY '89, 350 school-aged patients were enrolled, a number slightly down from prior years. However, more of the students were long-term, and their subject load necessitated their being in the classroom for longer periods of time. Under these circumstances, the staff frequently must determine whether students may advance to the next grade.

Realizing that sick children are faced with physical and psychological pressures of illness, the teachers try to minimize students' anxieties about school. In this relaxed environment, the curriculum is tailored to individual needs based on information from the hometown school and the patient's current condition.



Nursing

Nursing care at the Clinical Center combines the challenge of patient care with the demands of clinical research. The staff maximizes its continuity of care and nursing expertise in the unique requirements of each patient population and protocol. Thus, the department is able to capitalize on opportunities for clinical practice and innovation that are an integral part of the Clinical Center.

The department achieved a level of national recognition and reputation as a leader in the nursing profession. The cancer nursing service presented a national specialty conference entitled "Safe Handling of Anti-Neoplastic Agents." The sixth national conference on computer technology in nursing was held for more than 550. Specialty groups, including pediatric critical care nurses and neuroscience nurses, frequently toured the Clinical Center nursing facilities.

Staff members often are invited to present at major national meetings and forums. In order to share the efforts of colleagues at the Clinical Center, commemoration of Nurses Day 1989 focused on a nursing research poster session exhibiting posters that had been presented at national conferences during the past two years. The posters were set up for an afternoon in the Visitor Information Center so that the nursing staff was able to view them and discuss the findings with the authors. The central location enabled other health care professionals to become familiar with some of the nursing research.

Approaches to nursing research have generated innovative solutions in response to changing needs and altered roles in clinical research. As part of an evolving practice model in the critical care/heart & lung nursing service, a clinical nurse specialist has served as mentor for the nursing staff, facilitated the research process, and functioned as an expert resource for both patients and staff. This model will guide the department in full implementation of clinical nursing research to enhance the care provided to patients. In addition, the relationship with the National Center for Nursing Research continues to develop as collaboration on a variety of projects expands.

Each year department recognition is given to staff members who have made an exceptional contribution to the profession. In FY '89, 92 nurses and seven patient care units were honored. Statewide recognition was achieved when Clinical Center staff nurses were awarded Maryland Nurses Association "Nurse of the Year" and Maryland Hospital Association "Nurse of the Year." Members of the staff have been appointed as national representatives for the nursing profession through participation in committees such as the President's Commission on AIDS.

The nursing department is committed to educational programs. The staff participated in many intramural and extramural presentations. Twelve nursing research projects concluded during FY '89 and 23 formal patient education programs were initiated. The department sponsored a variety of ongoing programs aimed at education for nurses in the community. The cancer training program, the neuroscience internship program, and the

professional updated program are successful and in demand. Each has become a resource for recruitment of skilled, motivated, permanent nurses.

Recruitment and retention of the nursing staff remain a priority; the Clinical Center nursing department has one of the lowest vacancy rates in the country. While the current staff is essential in maintaining ongoing programs, ability to respond to new initiatives has been a unique capability for Clinical Center nursing recruitment. In the spring, a forum was held to familiarize area nurses with HIV infection and related Clinical Center programs. An effective radio campaign contributed to the enthusiastic response to the forum. Many nurses joined the staff after learning more about the innovative and challenging research that the Clinical Center directs toward HIV-related infections. A nursing job satisfaction survey administered during FY '89 validated the effectiveness of many of these retention programs and documented a widespread increase in job satisfaction from the previous year.

Outpatient

The role of the Outpatient Department becomes even more crucial, as clinic days resemble the Metro Center at rush hour; the Outpatient Department can be thought of as keeping the tracks open for the 144,000 outpatients seen in FY '89.

In addition to the 45 clinics that it manages, the Outpatient Department also is responsible for admissions; EKG, echoencephalography, and stress laboratories; the messenger and escort service; the travel and voucher office; local transportation; and the Ober United Travel Agency. Each section provides special services to Clinical Center patients to ensure smooth and efficient progress through inpatient and outpatient areas.

The first stop for all new inpatients and outpatients is the admission section. The staff must ensure that all admission information for each patient is accurate. The admission section also serves as the administrative liaison between the Clinical Center staff and the administrators who are on call after hours, on weekends, and on holidays.

The patient escorts transport patients and specimens throughout the Clinical Center. The messenger and escort service, which has been under contract for four years, is a liaison between patients and the professional staff.

The medical clerks on the eight outpatient clinics provide administrative support, supplies, and medical equipment for the professional staff. The medical clerks greet the patients upon their arrival to the clinics and assist them throughout their visit.

The Ober United Travel Agency assists Clinical Center patients and NIH staff members with travel arrangements.

Patient Activities

Recreation is an important part of a healthy lifestyle. The Patient Activities Department (PAD) helps patients improve their health through therapeutic recreation. The department emphasizes involvement, freedom of choice, and enjoyment on behalf of patients. All activities take into account the patients' assessed needs and limitations, and support Clinical Center research.

In FY '89 the department's Quality Assurance Committee completed a study of elements and indicators in preparation for data collection in 1990; analyzed an audit of MIS referrals and took steps to strengthen the referral process; conducted an external review of the department with three evaluators inspecting records, staff, and programming, and providing data to the committee; and introduced the issue of clinical privileging, which will be affected in FY '90.

PAD planned more than 1,160 leisure activities for patients and their families each month such as crafts and special events, as well as bedside activities to help individuals fill their non-treatment time pleasurably. The patient library circulated an average of 735 books each month, in addition to distributing magazines, audiotapes, and videotapes.

New programs and services initiated in FY '89 include complete renovation of the patient library; expansion of the pet therapy program; design, execution, and completion of a quilting project for NCI AIDS patients, which is framed and hanging in the 12th floor clinic; provision of therapeutic recreation services to patients of the Pediatric Intensive Care Unit (PICU); and development and execution of a high adventure program for pediatric patients of 3 East.

Social Work

Unlike a community hospital, where patients are likely to have their support structure close at hand, the Clinical Center hosts patients from around the world. Therefore it is important that the Social Work Department fill gaps in support for patients far from their traditional networks of aid and comfort.

The department provides support services to all patients who come to the hospital and to their families offering ways to help restore, maintain, and improve health. The department's major priorities are mental health, discharge planning, crisis intervention, rehabilitation, community liaison, and coping with the process of dying and death.

With knowledge of how psychological, social, and physical health factors may interact, social workers interpret individual responses to illness and hospitalization, and counsel accordingly. Clinical intervention helps each patient and family restore, sustain, or improve strength for coping in the present and planning for the future. In FY '89 the staff counseled more than 6,000 patients. More than 27,000 social work contacts were made with individuals and family members, and more than 600 group meetings were held.

The HIV counseling program, located in the Social Work Department, coordinates HIV counseling services to newly diagnosed HIV-positive patients, and active AIDS patients and their families. Transmission issues, financial and community resources, on-going psychosocial counseling services, and coordination of resources for patients returning to other states are available.

The volunteer services program, staffed by a full-time director, is an integral part of the department. It offers volunteer opportunities to community people interested in assisting researchers, nurses, physicians, and other patient care specialists in delivering quality health care and emotional support to patients and families. In FY '89, 200 individuals volunteered more than 25,000 hours through programs sponsored by the Retired Senior Volunteer Program, the American Red Cross, the Clinical Center Volunteer Program, and special interest groups.

Volunteers provide many personal services that help patients and families adjust more easily to the hospital environment. In support service areas, volunteers provide foreign language interpreters, give general information, provide some escort services, deliver mail and flowers to the bedside, answer telephones, assist patients with menu selection, provide refreshments to patients and families in waiting areas, and contribute to a variety of craft activities.

Spiritual Ministry

The Department of Spiritual Ministry, comprised of nine full- and part-time chaplains and one full-time secretary, ensures that the religious and spiritual needs of patients are considered and addressed. The full-time chaplains represent the two largest constituencies in the Clinical Center—Protestant and Roman Catholic. One Rabbi and four Roman Catholic chaplains comprise the part-time staff. A chaplain is cognizant of the needs of all patients and often acts as a liaison on behalf of a patient of another faith group and that patient's own faith representative. The department secretary serves all the faith groups, receives patients and families, and refers inquiries and requests to the appropriate chaplain.

The highest priority in spiritual care is personal visitation of a chaplain with patients and their loved ones. This accounts for more than 50 percent of the chaplain's regular day. During visits with patients, chaplains actively listen and sensitively engage in conversation about the patient's current experiences in light of the patient's spiritual orientation and religious heritage as it impacts upon the present and future.

Another aspect of spiritual care facilitated by the chaplains is religious rites and observances. Roman Catholic chaplains conduct mass each day; Protestant chaplains lead worship on Sundays and during mid-week; and the Rabbi conducts a Sabbath service on Friday afternoons. A volunteer staff group provides leadership in Muslim prayers on Friday afternoons and occasional weekdays. Additional observances and services are held on "holy days," as memorials for individual patients and staff, or as special rites. Most regularly scheduled faith group activities take place in the 14th floor interfaith chapel. Small spiritual care support groups are led in various units of the Clinical Center.

Other department activities include: participating in bioethics consultation; supervising students in clinical pastoral education; handling interdisciplinary case work; participating in Clinical Center sponsored educational programs; sharing in community programs for health promotion; representing NIH at national meetings of ecclesiastical and professional groups; promoting health awareness and spirituality; participating in staff education programs; leading workshops in the community, for example, in the area of loss and grief; and writing for publications such as journals, books, and newsletters.

In the past year, the chief of the department, LeRoy Kerney, died after 26 years of service. In his honor, the annual Kerney Memorial Lecture series was inaugurated with distinguished speakers addressing issues pertinent to theology, research, and science.

A new phase for the department commenced when offices were moved from scattered locations into one suite of offices on the 14th floor. The new location contributes to easier access for patients and staff, and enables a more adequate response for a counseling environment.

Patient Support Services

Housekeeping and Fabric Care

Around every corner in the complex maze of building 10, employees dressed in light green or grey can be found seven days a week, 24 hours a day, scouring, sanitizing, and straightening up the surroundings. These individuals are part of the 200-member staff of the Housekeeping and Fabric Care Department (HFCD). This department is responsible for maintaining a safe and clean environment in the hundreds of offices and patient rooms, six miles of hallways and public spaces, and more than 1,000 laboratories within the building.

The department's most prominent duty is to maintain sanitary patient care areas. This effort is supported by an ongoing training program emphasizing the latest techniques in hospital asepsis.

In FY'89, the HFCD, in cooperation with the CC Safety Officer, CC Building Services Manager, and Division of Safety and Engineering Services staff, resolved a long-standing JCAHO contingency regarding waste removal. The solid waste compactors were relocated from the B1 loading dock to the B2 dock. This accomplished the separation of incoming clean deliveries from outgoing waste.

The fabric care section provides clean linens for the hospital and clinics and laundry service for all of NIH. During FY'89, 1.4 million pounds of laundry, 64,000 lab coats, and 39,000 pieces of work clothing were delivered throughout the reservation and Poolesville Animal Care Facility.

At the close of FY'89, some new challenges faced HFCD with the prospect of closing the service tunnel connecting building 10 to the laundry and incinerator in other buildings. Alternative systems for delivering hospital linens and removing medical pathological waste boxes are under consideration.

Information Systems

The 50-member staff of the Information Systems Department (ISD) coordinates the planning, development, operations, and maintenance of Clinical Center computing activities.

Formed in 1983, the department operates a computer center providing round-the-clock service to patient care units and other departments engaged in administrative, diagnostic, and therapeutic activities. In addition, ISD provides advice and support to Clinical Center departments that have or are contemplating acquiring micro- or minicomputers, or other computer hardware or software.

ISD manages and operates the Clinical Center Medical Information System (MIS), a large "real-time" computerized system that provides access to patient records to retrieve and add data. Medical orders are entered directly by physicians or nursing personnel using video terminals that connect to a central computer. Patient information is displayed on video screens and printed for incorporation into the patient record.

MIS is used by 4,000 physicians, nurses, and others at work in the Clinical Center. Each year, ISD trains approximately 250 physicians, 300 nurses, and 550 other staff members to use the system. There are more than 250,000 patient biographical records on file, with complete clinical records retained on the system for all current patients. Each day 13,000 new entries are made to patient records. In FY '89, more than one million records were added to the system and a like number of vital sign entries were made; more than 10 million pages of patient medical records were printed. The amount of patient information on disk files, available for instant retrieval, exceeds one billion characters. In addition, patient data on 200,000 former Clinical Center patients is maintained at the Division of Computer Research and Technology for retrospective research studies.

To provide support to the wide range of MIS users, ISD maintains 25,000 screen display formats and hundreds of printout formats. Each year, ISD creates 5,000 new or revised screen formats and handles 40,000 telephone calls related to MIS support and enhancement.

During FY '89, many enhancements were made to data processing at the Clinical Center. Methods were developed to improve the extraction of selected elements of research data from MIS and to transfer this information to authorized personal computers operated by individual researchers. Attention was focused on patient confidentiality; only specifically authorized users have access to the data.

Progress was made in developing multi-function terminals that can emulate and therefore replace a variety of special purpose terminals. These include personal computers from the Macintosh, PC compatible, and Sun 386i families. Two powerful computers

installed in the ISD computer center use extensive disk storage capacity. This hardware and some new software packages will enable ISD to provide better service to many departments and enhance patient care and research capabilities. In addition, the installation of a constant power supply has virtually eliminated the problem of brief electrical outages, the most common cause of MIS downtime.

Materials Management

The Materials Management Department provides a wide variety of services to other departments. In addition to the office of the chief, the department is composed of the purchasing and personal property management section (P/PPM), central hospital supply section (CHS), and storage and distribution section (S&D).

The P/PPM staff is responsible for all requests for supplies and equipment. It initiates all issues of Clinical Center stocks; requisitions items from NIH, HHS, GSA, VA, NLA, and other government sources; maintains optimum stock levels for all central hospital supply expendable items; maintains current records of CC equipment; and is responsible for processing the required transactions for disposal of property. The staff is responsible for purchases of supplies not directly obtainable from government sources. It also maintains a library of procurement literature and vendor catalogs for use in identifying items and sources of supply.

During the past year, the scope of procurement responsibility expanded beyond acquiring items for CHS and surgery to include a number of other departments. This adjustment maximizes the use of human resources by enabling non-acquisition personnel to spend more time on the duties for which they are specially trained. CHS is the central sterilization facility of the Clinical Center. The staff is responsible for collecting, decontaminating, cleaning, packaging, sterilizing, and reissuing all instrument sets, trays, equipment, and medical supplies and devices used in direct patient care. CHS also processes reusable items.

The storage and distribution section is responsible for the receipt and issuance of equipment and supplies. The staff packs and ships outgoing packages (excluding patient drug mailouts), provides clean and safe storage of all items maintained in warehouse stock, and coordinates movement of furniture and equipment.

Medical Record

To assure the effectiveness of the medical record, the Medical Record Department is concerned with systems for the maintenance, analysis, storage, and retrieval of medical records while preserving the integrity, privacy, and legality of the information they contain.

The Medical Record Department maintains a medical record for each Clinical Center patient. Some records contain only one or two sheets of paper; others are multi-volume tomes equaling the *Encyclopedia Britannica* in size. The appropriate record is made available for every clinic visit and hospital admission. Records also are used in medical and scientific research, and for medicolegal or administrative action. The medical record describes the care of the patient and provides a continuous accounting of patient management.

Medical record technicians work in every section of the department and perform most of the important technical functions that are crucial to day-to-day operations. Technicians analyze record documentation for compliance with standards established by the Joint Commission on Accreditation of Health Care Organizations, code diagnoses and operative procedures for later research retrieval, inspect and maintain the microfiche of retired records, and process all requests for release of confidential information.

Medical record administrators are health professionals responsible for the overall management of the department including its people, systems, and 250,000 medical records of patients treated at the Clinical Center since 1953. Administrators are responsible for establishing systems, data bases, and indices for treatment, research, health planning, and quality assurance. They develop departmental policies and procedures, supervise and evaluate employees, and provide expert advice regarding record management and related topics.

This effort can be appreciated by glancing at some figures for FY '89. Staff in the files section pulled more that 90,000 medical records for patient care and 15,000 for research, and filed more than 500,000 individual medical reports. The medicolegal section processed more then 9,000 requests for disclosure and dispatched more than 150,000 pages of medical information. Staff in the record processing section analyzed 30,000 medical records and processed close to 20,000 dictated medical reports. The coding and retrieval section coded more than 1,000 research retrievals, 10,000 admissions, and 50,000 diagnoses and operations. In addition, responsibility for medical staff credentialing and research protocol review was transferred to the department in FY '89. As a result, the credentials and protocol services section (CPSS) was created. During the year, CPSS staff processed appointments for more than 1,000 members of the medical staff and 500 research protocols.

Nutrition

In addition to providing quality nutritional care and food service to patients, the Nutrition Department supports institute protocols designed with a nutrition component and conducts research in clinical nutrition and food service management.

A two-week menu cycle offers 96 modifications to meet the needs of patients on a variety of diet prescriptions. The food choices offered on these menus reflect the current dietary guidelines for healthy eating. The *Clinical Center Diet Manual* provides guidelines for various types of therapeutic diet plans used at the Clinical Center.

All meals, snacks, and supplements for patients are prepared in the main kitchen. Staffed with supervisors, cooks, bakers, and food service workers, the main kitchen operates 14 hours a day, seven days a week. The kitchen serves more than 30,000 meals a month at patients' bedsides. Extended services meet the needs of patients whose meals must be served early or late because of tests and procedures. The department also provides an average of 200 meals to outpatients each month.

Registered dietitians work as members of the medical team, assess patients' needs for various levels of nutrition intervention, and provide care based on the needs identified. A patient with AIDS, for example, may follow a different diet plan than a patient with diabetes.

The department's internal computer system helps provide state-of-the-art care and services to patients and their families, and support the institutes' research.

Pharmacy

The Pharmacy Department is divided into various units, serving all Clinical Center inpatients and outpatients who are undergoing any type of drug therapy. Clinical pharmacists are assigned to specific patient care areas including cardiology, mental health, oncology, intensive care, and internal medicine. These specialists work directly with patients and consult with professional staff regarding drug therapies.

A computerized network links all areas of the pharmacy and maintains detailed records of the quantity, dates, and times that drugs are dispensed to each patient. These extensive patient records are essential; the Pharmacy Department must account for every dose of investigational drug and maintain the integrity of customized drug regimens.

All investigational drugs dispensed to Clinical Center patients must be registered and controlled by the Pharmacy Department. Each year, pharmacists formulate and package more than three million investigational drug units. Tablets, capsules, or injections are prepared as required by the protocol. Pharmaceutical chemists test the potency and stability of the drugs manufactured by the Pharmacy Department.

The inpatient pharmacy mixes an average of 750 IV admixtures each day; however, there are some days when the workload exceeds 1,000. To prepare an admixture, the pharmacists add concentrated drugs to plastic bags containing sterile saline or dextrose in water. Intravenous solutions are prepared under rigorous standards of sterility and quality control by specially trained pharmacy personnel to ensure that none of the medications mixed in intravenous solutions will interact or become unstable. To prevent contamination by airborne materials, solutions are prepared in laminar flow hoods that filter out dust and bacteria.

The inpatient pharmacy dispenses close to one million unit doses of medicine each year. Most inpatients receive their medication through a "unit dose" distribution system. To ensure that each patient receives the correct dose of the correct drug at the correct time, a 24-hour supply of unit dose medicines is placed in a drawer labeled with the patient's name and delivered to the nursing unit. Each dose is individually packaged, labeled, and protected from contamination up to the time it is administered.

The outpatient pharmacy fills prescriptions for outpatients, as well as for inpatients who are on pass or about to be discharged. The outpatient pharmacy fills approximately 400 prescriptions each day. Medications are mailed to patients who are in long-term studies and do not require frequent follow-up visits. The success of the treatment protocol depends on strict adherence by the patient to the directions of the prescribing doctor. To clarify any questions or misunderstandings, pharmacists counsel patients about their medications.

In FY '89, the 13th floor inpatient oncology pharmacy satellite was remodeled to provide a modern work space with separate chemotherapy preparation and order processing areas. A computer network system was completed linking areas of the pharmacy that maintain disposition records for investigational drugs received by Clinical Center patients. The support of AIDS research and treatment became a significant pharmacy effort involving 12 FTEs of the department's personnel resources. Also, several clinical pharmacists established an *AIDS Facts* column in a national hospital pharmacy journal. The department also began efforts to explore the possibilities of the Technology Transfer Act to share drug research information with private industry. Health education efforts in the outpatient pharmacy were increased to include drug information leaflets that are dispensed with all medication, displayed on pamphlet racks, and distributed in the patient reference library. Inpatient pharmacy workload basically leveled off while the outpatient pharmacy prescriptions increased by 10 percent. Clinical pharmacy activities were up significantly; the number of patients counseled increased by 52 percent and the number of investigational drugs developed and issued were up by 50 percent. These statistics, however, do not reflect the increased complexity and labor intensity of the services required by the new protocols.

During the coming year, the department will further computerize its systems, improve its physical plant, and implement a strategic plan to deal with the anticipated increase in demand for services.

Clinical Center Communications
National Institutes of Health
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